

What is claimed is:

1. A microwave oscillator for inducing parallel feedback from collector to a base of a bipolar transistor, comprising:

5 (a) a first microstrip line with a released end coupled to said base terminal,

(b) a second microstrip line with a released end coupled to said collector terminal,

(c) a dielectric resonator electromagnetically coupled to said first microstrip line and said second microstrip line, and

10 (d) a high impedance line for bias supply to said base terminal coupled at a position where a distance from the released end on said first microstrip line to a point closest to a center of said dielectric resonator is  $\lambda g1/4$ ,

wherein  $\lambda g1$  is a guide wavelength of the first microstrip line at an oscillation frequency of said microwave oscillator.

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2. A microwave oscillator for inducing parallel feedback from a collector to a base of a bipolar transistor, comprising:

(a) a first microstrip line with a released end coupled to said base terminal,

20 (b) a second microstrip line with a released end coupled to said collector terminal,

(c) a dielectric resonator electromagnetically coupled to said first microstrip line and said second microstrip line,

25 (d) a high impedance line for bias supply to said base terminal coupled at a position where a distance from the released end on said first microstrip line to a point closest to a center of said dielectric resonator is  $\lambda g1/4$ , and

(e) a high impedance line for bias supply to said collector terminal

coupled at a position where the distance from the released end on said second microstrip line to the point closest to the center of said dielectric resonator is  $\lambda g2/4$ ,

wherein  $\lambda g1$  and  $\lambda g2$  are a guide wavelengths of the first microstrip line and the second microstrip line respectively at the oscillation frequency of said microwave oscillator.

3. A microwave oscillator for inducing parallel feedback from a drain to a gate of a field effect transistor, comprising:

- 10 (a) a first microstrip line with a released end coupled to said gate terminal,
- (b) a second microstrip line with a released end coupled to said drain terminal,
- (c) a dielectric resonator electromagnetically coupled to said first microstrip line and said second microstrip line, and
- 15 (d) a high impedance line for bias supply to said gate terminal coupled at a position where a distance from the released end on said first microstrip line to a point closest to a center of said dielectric resonator is  $\lambda g1/4$ ,

wherein  $\lambda g1$  is a guide wavelength of the first microstrip line at an oscillation frequency of said microwave oscillator.

4. A microwave oscillator for inducing parallel feedback from a drain to a gate of a field effect transistor, comprising:

- 20 (a) a first microstrip line with a released end coupled to said gate terminal,
- (b) a second microstrip line with a released end coupled to said drain terminal,

(c) a dielectric resonator electromagnetically coupled to said first microstrip line and said second microstrip line,

(d) a high impedance line for bias supply to said gate terminal coupled at a position where a distance from the released end on said first microstrip line to a point closest to a center of said dielectric resonator is  $\lambda g1/4$ , and

(e) a high impedance line for bias supply to said drain terminal coupled at a position where the distance from the released end on said second microstrip line to the point closest to the center of said dielectric resonator is  $\lambda g2/4$ ,

10 wherein  $\lambda g1$  and  $\lambda g2$  are a guide wavelengths of the first microstrip line and the second microstrip line respectively at the oscillation frequency of said microwave oscillator.

5. A low-noise converter incorporated in a microwave receiving  
15 antenna comprising:

(a) a waveguide for transmitting a satellite signal received in said receiving antenna,

(b) a waveguide probe for converting the satellite signal in said waveguide into a microstrip line mode,

20 (c) a low-noise amplifier of which input port is coupled to said waveguide probe,

(d) a mixer for receiving an output signal of said low-noise amplifier, and

25 (e) a local oscillator of which output port is coupled to said mixer, wherein said local oscillator includes a microwave oscillator for inducing parallel feedback from collector to a base of a bipolar transistor, comprising:

(i) a first microstrip line with a released end coupled to said base terminal,

(ii) a second microstrip line with a released end coupled to said collector terminal,

5 (iii) a dielectric resonator electromagnetically coupled to said first microstrip line and said second microstrip line, and

(iv) a high impedance line for bias supply to said base terminal coupled at a position where a distance from the released end on said first microstrip line to a point closest to a center of said dielectric resonator is

10  $\lambda g1/4$ ,

wherein  $\lambda g1$  is a guide wavelength of the first microstrip line at an oscillation frequency of said microwave oscillator.

6. A low-noise converter incorporated in a microwave receiving  
15 antenna comprising:

(a) a waveguide for transmitting a satellite signal received in said receiving antenna,

(b) a waveguide probe for converting the satellite signal in said waveguide into a microstrip line mode,

20 (c) a low-noise amplifier of which input port is coupled to said waveguide probe,

(d) a mixer for receiving the output signal of said low-noise amplifier, and

(e) a local oscillator of which output port is coupled to said mixer,

25 wherein said local oscillator includes a microwave oscillator for inducing parallel feedback from a collector to a base of a bipolar transistor, comprising:

(i) a first microstrip line with a released end coupled to said base terminal,

(ii) a second microstrip line with a released end coupled to said collector terminal,

5 (iii) a dielectric resonator electromagnetically coupled to said first microstrip line and said second microstrip line,

(iv) a high impedance line for bias supply to said base terminal coupled at a position where a distance from the released end on said first microstrip line to a point closest to a center of said dielectric resonator is  $\lambda g1/4$ ,

10 and

(v) a high impedance line for bias supply to said collector terminal coupled at a position where the distance from the released end on said second microstrip line to the point closest to the center of said dielectric resonator is  $\lambda g2/4$ ,

15 wherein  $\lambda g1$  and  $\lambda g2$  are a guide wavelengths of the first microstrip line and the second microstrip line respectively at the oscillation frequency of said microwave oscillator.

7. A low-noise converter incorporated in a microwave receiving  
20 antenna comprising:

(a) a waveguide for transmitting a satellite signal received in said receiving antenna,

(b) a waveguide probe for converting the satellite signal in said waveguide into a microstrip line mode,

25 (c) a low-noise amplifier of which input port is coupled to said waveguide probe,

(d) a mixer for receiving the output signal of said low-noise amplifier,

and

(e) a local oscillator of which output port is coupled to said mixer,  
wherein said local oscillator includes a microwave oscillator for  
inducing parallel feedback from a drain to a gate of a field effect transistor,  
5 comprising:

(i) a first microstrip line with a released end coupled to said gate  
terminal,

(ii) a second microstrip line with a released end coupled to said  
drain terminal,

10 (iii) a dielectric resonator electromagnetically coupled to said first  
microstrip line and said second microstrip line, and

(iv) a high impedance line for bias supply to said gate terminal  
coupled at a position where a distance from the released end on said first  
microstrip line to a point closest to a center of said dielectric resonator is

15  $\lambda g1/4$ ,

wherein  $\lambda g1$  is a guide wavelength of the first microstrip line at an  
oscillation frequency of said microwave oscillator.

8. A low-noise converter incorporated in a microwave receiving  
20 antenna comprising:

(a) a waveguide for transmitting a satellite signal received in said  
receiving antenna,

(b) a waveguide probe for converting the satellite signal in said  
waveguide into a microstrip line mode,

25 (c) a low-noise amplifier of which input port is coupled to said  
waveguide probe,

(d) a mixer for receiving the output signal of said low-noise amplifier,

and

- (e) a local oscillator of which output port is coupled to said mixer,  
wherein said local oscillator includes a microwave oscillator for  
inducing parallel feedback from a drain to a gate of a field effect transistor,  
5 comprising:
- (i) a first microstrip line with a released end coupled to said gate  
terminal,
- (ii) a second microstrip line with a released end coupled to said  
drain terminal,
- 10 (iii) a dielectric resonator electromagnetically coupled to said first  
microstrip line and said second microstrip line,
- (iv) a high impedance line for bias supply to said gate terminal  
coupled at a position where a distance from the released end on said first  
microstrip line to a point closest to a center of said dielectric resonator is  $\lambda g1/4$ ,
- 15 and
- (v) a high impedance line for bias supply to said drain terminal  
coupled at a position where the distance from the released end on said second  
microstrip line to the point closest to the center of said dielectric resonator is  
 $\lambda g2/4$ ,
- 20 wherein  $\lambda g1$  and  $\lambda g2$  are a guide wavelengths of the first microstrip  
line and the second microstrip line respectively at the oscillation frequency of  
said microwave oscillator.